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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/576,273

04/18/2006

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EXAMINER

AHMED, SELIM U

ART UNIT

PAPER NUMBER

2826

NOTIFICATION DATE

DELIVERY MODE

04/14/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/576,273	TOSHIKIYO, KIMIAKI	
	Examiner	Art Unit	
	SELIM AHMED	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 April 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/18/2006, 9/29/2006, 12/08/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of figures 15, 16, including claims 1, 13, 15, 17 is acknowledged. Applicant's arguments see Election, filed 01/12/2009, with respect to Election/Restriction sent on 12/12/2008 have been fully considered and are persuasive. The Election/Restriction of claims 1-18 has been withdrawn.
2. The Preliminary Amendment to claim 3 filed on 04/18/2006 has been entered.

Priority

3. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed with the Japanese application 2003-421111.

Information Disclosure Statement

4. The Information Disclosure Statements filed on 7/18/2006, 9/29/2006, 12/09/2006 has been considered.

Oath/Declaration

5. The oath or declaration filed on 4/18/2006 is acceptable.

Drawings

6. The drawings filed on 4/18/2006 are acceptable.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 12 recite the limitation "said light transmitting film" in line 6 and line 8 respectively. There is insufficient antecedent basis for this limitation in the claims. The dependent claims 2-11, 13-18 inherit the deficiencies.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-9, 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Tamechika et al (JP 2001-108812A; Tamechika hereinafter; Applicant's IDS reference submitted on 07/18/2006).

With regard to claim 1, Tamechika discloses a light-collecting device (e.g. Fig. 3A, para[0048] which collects incident light, comprising: a substrate (Fig. 3C, element 6, para[0015]) into which the incident light is incident (this limitation is functional); and above said substrate 6, a plurality of light-transmitting films (e.g. Fig. 2C, element 5) formed in a region (e.g. Fig. 5C, element 5 region) into which the incident light is incident (this limitation is functional), wherein said light-transmitting film 5 forms a zone in which a width of each zone is equal to or shorter than a wavelength of the incident light (e.g. para[0016]), and the plurality of said light-transmitting films 5 form an effective refractive index distribution (para[0015]).

With regard to claim 2, e.g. Fig. 3(a) of Tamechika discloses the light-collecting device according to Claim 1, wherein in the plurality of said light-transmitting films 5, each light-transmitting film has a constant line width (Fig. 3(a)).

With regard to claim 3, e.g. Fig. 3(a), para[0016] of Tamechika discloses light-collecting device according to Claim 1, wherein in one of areas of said light-transmitting films divided by a length equal to or shorter than the wavelength of the incident light, a sum of the line widths of the light-transmitting films is smaller than a sum of the line widths in another one of the areas that is closer to a zone

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center.

With regard to claim 4, e.g. Fig. 3(a) of Tamechika discloses the light-collecting device according to Claim 3, wherein the zone model is concentric circles.

With regard to claim 5, Tamechika does not explicitly disclose $\Delta n(r) = \Delta n_{\max} [1 + m - n_1 r^2 / (2 \lambda f)]$ is approximately satisfied, where λ is the wavelength of the incident light, f is a focal length, n_o is a refractive index of a medium on a light incoming side, n_1 is a refractive index of a medium on a light outgoing side, m is a non-negative integer, and a maximum value of a refractive index of said light-transmitting film is $n_o + n_{\max}$, when a difference from the n_o is $\Delta n(r)$.

However, when the semiconductor compound recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of anticipation has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

With regard to claim 6, Tamechika does not explicitly disclose $W = a(1 + m - n_1 r^2 / (2 \lambda f))$ is satisfied, where; λ is the wavelength of the incident light, f is a focal length, a is a width of the divided area, n_1 is a refractive index of a medium

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on a light outgoing side, m is a non-negative integer, and r_m is a Fresnel zone boundary, that is a natural number which satisfies $r_m^2 = 2m \lambda f/n_1$, taking that a sum W of the line widths of said light-transmitting films in one of the divided areas having an inner radius r where r is larger than r_m and smaller than r_{m+1} . However, when the semiconductor compound recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of anticipation has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

With regard to claim 7, e.g. Fig. 2(a)-(c), element 5 of Tamechika discloses the light-collecting device according to Claim 1, wherein heights of said light-transmitting films are constant in a direction normal to said light-transmitting films.

With regard to claim 8, e.g. Fig. 2(a)-(c), element 5 of Tamechika discloses the light-collecting device according to Claim 1, wherein a shape of cross sections of said light-transmitting films in a direction normal to said light-transmitting films is rectangular.

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With regard to claim 9, e.g. para[0036] of Tamechika discloses the light-collecting device according to Claim 1 wherein each of said light-transmitting films includes one of TiO₂, ZrO₂, Nb₂O₅, Ta₂O₅, Si₃N₄ and Si₂N₃.

With regard to claim 11, e.g. para[0037] of Tamechika discloses the light-collecting device according to Claim 1, wherein each of said light-transmitting films includes one of benzocyclobutene, polymethymethacrylate, polyamide and polyimide.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamechika in view of view of Jiang et al (US 2005/0061950; Jiang hereinafter).

With regard to claim 10, Tamechika discloses all of the limitations of claim 1 with the exception of the light-collecting device, wherein each of said light-transmitting films includes one of SiO₂ doped with B or P, that is Boro-Phospho Silicated Glass, and Teraethoxy Silane. However, para[0075] of Jiang discloses Boro-Phospho Silicate Glass (BPSG) as a light transmitting film within imaging

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device for its suitable light transmitting properties. It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute Jiang's BPSG film with any of TiO_2 , ZrO_2 , Nb_2O_5 , Ta_2O_5 , Si_3N_4 and Si_2N_3 for predictable results.

10. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamechika in view of view of Shizukuishi (US 20030215967; Shizukuishi hereinafter).

With regard to claim 12, Tamechika discloses all of the limitations of the light collecting device of claim 1 but does not disclose a solid state imaging apparatus comprising unit pixels that are arranged in a two-dimensional array, each unit pixel including the respective light-collecting device of claim 1.

However, e.g. in Fig. 1B, col. 4, lines 13-39 of Shizukuishi discloses a solid state imaging apparatus (e.g. Fig. 1B) comprising unit pixels (e.g. 12R, 12B, 12G) that are arranged in a two-dimensional array (e.g. Fig. 1B). Since light collecting devices are building block of any imaging pixel, it would have been obvious to one having ordinary skill in the art at the time of the invention to combine Tamechika's light collecting device within Shizukuishi's pixel in order to form a two-dimensional array of unit pixels for more efficient solid state imaging apparatus.

With regard to claim 13, e.g. Figs. 2-3 of Tamechika discloses the solid-state imaging apparatus according to Claim 12, wherein line widths (widths shown in Fig. 3(a)) of said light-transmitting films 5 are different between said light-collecting devices of said unit pixels located close to a zone center and said light-collecting devices of said unit pixels located near the zone periphery (e.g. Fig. 3(a)).

With regard to claim 14, e.g. Fig. 1(B) of Shizukuishi's discloses the solid-state imaging apparatus according to Claim 12, comprising at least: a first unit pixel for first color light (e.g. 12B) out of the incident light; and a second unit pixel for second color light (e.g. 12G) which has a typical wavelength that is different from a typical wavelength of the first color light (Blue and green have different wavelengths). So, it would have been obvious to one having ordinary skill in the art at the time of the invention to include a first unit pixel for first color light out of the incident light; and a second unit pixel for second color light which has a typical wavelength that is different from a typical wavelength of the first color light for building a color imaging system as disclosed by Shizukuishi. Furthermore, Shizukuishi discloses said first unit pixel includes a first light-collecting device, and said second unit pixel includes a second light-collecting device but does not explicitly disclose a focal length of the second color light is equal to a focal length of the first color light in said first light-collecting device. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to

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optimize the imaging system such that a focal length of the second color light is equal to a focal length of the first color light in said first light-collecting device.

With regard to claim 15, e.g. Figs. 2-3 of Tamechika discloses the solid-state imaging apparatus according to Claim 12, wherein sums of the line widths of said light-transmitting films in each of the divided areas are different between a light-collecting device of said unit pixel located in a center of a plane on which said unit pixel is formed and a light-collecting device of said unit pixel located in the periphery of the plane. Tamechika does not explicitly disclose light-collecting device of said unit pixel located in a center of a plane on which said unit pixel is formed and a light-collecting device of said unit pixel located in the periphery of the plane. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to optimize the unit pixel's location (i.e. center or periphery in the plane) for making the imaging system more efficient.

With regard to claim 16, e.g. Figs. 2-3 of Tamechika discloses the solid-state imaging apparatus according to Claim 12, wherein a plane on which said pixels are formed is divided by concentric areas (e.g. Fig.3) from a center of the plane to the periphery (e.g. Fig.3). Tamechika does not explicitly disclose the focal lengths of said light-collecting devices of said unit pixels belonging to a same area are equal, and focal lengths of said light-collecting devices of said unit pixels belonging to areas other than the same area are different. However, it

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would have been obvious to one having ordinary skill in the art at the time of the invention to optimize the focal length for more efficient imaging system.

11. Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamechika in view of Shizukuishi and further in view of Shinohara et al (US 2004/0000681: Shinohara hereinafter).

With regard to claim 17, Tamechika in view of Shizukuishi disclose all of the limitations of claim 12 with the exception of each unit pixel further includes: a wiring layer having an aperture above a light-receiving device, on a light-outgoing side plane of said light-collecting device, and a focal point of light collected by said light-collecting device matches a position of the aperture of said wiring layer. However, e.g. Fig. 16 of Shinohara discloses each unit pixel further includes: a wiring layer 21 having an aperture (as shown by 27, 28 entrance) above a light-receiving device 16, on a light-outgoing side plane of said light-collecting device (e.g. Fig. 16), and a focal point of light collected by said light-collecting device matches a position of the aperture of said wiring layer (e.g. Fig. 16). It would have been obvious to one having ordinary skill in the art at the time of the invention to include the wire layer of Shinohara within Tamechika's device for interconnecting electrical signal.

Allowable Subject Matter

12. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of records fail to teach or suggest the solid-state imaging apparatus particularly with said unit pixels located in a center of a plane on which said unit pixels are formed, a central axis of each of said light-receiving devices is placed to match a central axis of each of said light-collecting devices, and in said unit pixels located in the periphery of the center of the plane, a central axis of each of said light-receiving devices and a central axis of each of said light-collecting devices are placed toward the center of the plane as in the combination of base claims 17 and 12.

Conclusion

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SELIM AHMED whose telephone number is (571)270-5025. The examiner can normally be reached on 9:00 AM-6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571)272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SA

/Sue A. Purvis/
Supervisory Patent Examiner, Art Unit 2826